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FAA Office of NextGen (ANG)

REDAC / HF

Review of FY2022 – 2025 Proposed Portfolio

ATC / Technical Operations Human Factors

BLI Number: a11i

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Date: August 17, 2022

ATC / Technical Operations Human Factors Overview

What are the benefits to the FAA

- Improving the safety and efficiency of complex ATC systems by application of R&D to address factors affecting human performance in air traffic control operations and ATC system maintenance through improved guidance, selection, and training.

- Recommending and testing improvements to design, procedures, training, selection and placement; and mitigations to address human performance shortfalls.

What determines program success

- R&D Sponsors and Stakeholders in the ATO are able to make important workforce policy, acquisition, and operational management decisions based on the results of thorough, timely, and focused R&D efforts.

- When programs embrace human factors processes and requirements during system acquisition, they reduce human factors risks.

- Reducing human factors risks increases the likelihood for successful system implementation and operation, while reducing the likelihood for system design and engineering rework.

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ATC / Technical Operations Human Factors Program Support

People:

- Program Manager – Dan Herschler, Karl Kaufmann

- Subject Matter Experts – Bill Kaliardos

Laboratories:

- ANG-E25 Human Factors Branch, NextGen Aviation Research Division Research and Development Human Factors Laboratory

- AAM-520 NAS Human Factors Safety Research Laboratory

- John H. Volpe National Transportation Center

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Current FY22 Accomplishments

- **Developed an Alarms and Alerts Handbook** initial draft to guide system designers regarding signaling systems. (Completed Phase 3 of 5 for this project.)

- Completed an initial draft recommended **update to the Human Factors Job Aid**, which guides the application of human factors for practitioners in the Program Management Office (AJM).

- Completed a technical report on a study **evaluating the effectiveness of virtual air traffic training** in lieu of traditional classroom training for new hire controllers (AT Basics and Initial Qualification) during the COVID-19 pandemic.

- Completed development of a research protocol and survey for **assessing safety culture** in the Technical Operations workforce.

- Completed a test plan and laboratory setup for the **evaluation of the new color palette for ATC displays** in a brightly-lit environment (simulating daytime tower ambient illumination).

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Anticipated Research in FY23

Planned Research Activities

- **Human Factors Guidance for the Design, Implementation and Evaluation of AI/ML in the Human-Automation ATC Systems Context**
- **Human Performance Considerations for Enhancing Automation in Alaskan Flight Service Stations**
- **Update HF Job Aid and Develop HF Practitioner Training**

Expected Research Products

- **ANG Vision 2035 states that future ATC automation will collaborate with human counterparts. We will produce practical human factors guidance for design, implementation, and evaluation of AI/ML automation technologies for ATC to meet PMO need.**
- **Research will characterize FSS operations and tasks with new automation and produce HF recommendations and guidance for development and implementation of potential automation enhancements in the Alaskan FSS, to optimize controller performance.**
- **The program will develop guidance and training to inform AJM HF practitioners about HF tools and techniques that support development and evaluation of ATC systems. We expect improved compliance with FAA Order 9550.8 (Human Factors Policy) and related AMS policy and guidance.**

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Anticipated Research in FY24

Planned Research Activities

- Develop facility operational guidance and training for recognition and mitigation of workload effects on controller fatigue and performance.
- Develop ATC maintenance task guidance and user interface standards for Technical Operations personnel performing Remote Maintenance Monitoring functions, to include use of AR/VR capabilities.
- Update the Human Factors Design Standard (FAA HF-STD-HF-001) to incorporate the latest scientific information in design requirements for automated ATC systems, information display and management, workstation arrangement and display characteristics.

Expected Research Products

- ATC facility operational guidance and training recommendations for mitigating workload-induced fatigue effects
- Maintenance guidance and Tech Ops workstation user interface design requirements for incorporation of AR/VR capabilities for Remote Maintenance Monitoring and site repair collaboration
- Updated Human Factors Design Standard (will be version HF-STD-001C)

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Emerging FY25 Focal Areas

- **Stress and Performance -** Improved training to improve controller resilience and response to stress

- **Controller Job Performance Standards -** Controller performance standards that can be used to consistently measure progress in training, and to support job placement and selection decisions

- **Expanded Use of Alternative Training Delivery Systems –** Increased use of AR/VR and remote learning alternatives to reduce training cost while improving training effectiveness (skill acquisition and skill retention)

- **Continued Exploration of Automation Impacts on Controller Performance and Development of Mitigations –** Increase controller and controller team performance with alternative procedures and other mitigations to address increases in system automation and less frequent need for coordination among adjacent control positions

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ATC / Technical Operations Human Factors

Research Requirements

1. **Improved Safety, Reduced Hazards, And Error Mitigation In ATC**

2. **Automation Effects And Controller Performance**

3. **Improved Design And Operation Of ATC Systems**

4. **Improved Controller Selection And Training**

5. **Controller And Technical Operations Workforce Optimization**.

Outputs/Outcomes

- Training and procedures to mitigate potential performance decrements associated with long-term use of automation
- Training recommendations to increase transition to routine use of ATC automation, such as decision support tools
- Consensus job task performance standards that can inform consistent measurement of training progress

FY 2025 Planned Research

- Develop recommendations for mitigating the potential deskilling effects of long-term use of automation

- Recommend controller training approaches that measurably increase adoption and use of ATC automation capabilities and controller performance (efficiency).

- Develop consensus standards for job task performance for controllers and technical operations personnel.

Out Year Funding Requirements

RE&D	FY22	FY23	FY24
	$5.9M	$5.9M	$5.9M

F&E   N/A

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